Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PROPHYLACTICS

IN CHARGE OF
MARY M. RIDDLE

THE RELATION OF BACTERIOLOGY TO PREVENTIVE MEDICINE

By JOHN H. McCOLLOM, M.D.

Resident Physician, Boston City Hospital, South Department; Instructor in Contagious Diseases, Medical School of Harvard University

(Concluded)

Scarlet fever, reasoning by analogy, must be due to some specific organism, but this organism has not as yet been discovered. Certain observers claim to have found a streptococcus in the throats and blood of scarlet-fever patients. This organism resembles the streptococcus pyogenes, but it is said to differ from it by not coagulating milk when grown in pure cultures. These observers consider that the contagium of scarlet fever resides in this organism, that the disease is infectious only during the time that the throat is sore. They also state that the scales thrown off during the period of desquamation are not infectious, but there is abundant clinical proof to the contrary. There is a vast field of research open to the bacteriologist in searching for the cause of this disease. Klein, in a report to the Local Government Board of London, says that this streptococcus is the specific organism that causes the disease, and while his experiments are extremely interesting they do not seem to absolutely prove his point. If it could be established on a strict scientific basis that the desquamative stage of scarlet fever is not infectious, it would relieve patients from a tedious period of isolation and the hospital of a great number of convalescent patients. Since the bacteriological examination of throats has become so frequent, the association of scarlet fever and diphtheria has become less common, from the fact that the membrane frequently seen in the throats of scarlet-fever patients can only be differentiated by a bacteriological examination. An examination of thirty cases of scarlet-fever throats, made at the Bacteriological Laboratory of the Harvard Medical School, in which there was a distinct membrane, which clinically could not be distinguished from a diphtheritic membrane, showed the presence of the bacillus of diphtheria in only six instances. The importance of a definite diagnosis is very great, not only for purposes of treatment, but also for purposes of isolation, particularly in a hospital where the cases are rigidly classified. If the organism of scarlet fever is ever discovered, we may hope to find an antitoxin for the disease, but for the present, both in treatment and prophylaxis, we must grope in the dark.

Whooping-cough, although not a very fatal disease in this country, is yet so infectious that an early diagnosis for purposes of isolation is very important. The impossibility of making an early positive diagnosis is well recognized. When, in 1887, a German bacteriologist announced the discovery of a bacillus in the masses of mucus expectorated by patients with whooping-cough, it was hoped that the presence of this organism would furnish a sure and reliable means of diagnosis. Further investigation, however, has failed to establish the etiological relation between this organism and whooping-cough. This organism is described as a small, slender bacillus, solitary, in pairs or in chains. It is an aërobic non-liquefying motile bacillus. The presence of spores has been demonstrated. It grows on the usual culture media at room temperature. When a pure culture of this organism is injected into the air-passages or pulmonary parenchyma of young dogs and rabbits broncho-pneumonia and attacks of spasmodic coughing resembling those of whooping-cough are caused. In some few instances death has followed the injection, and when this has occurred the bacilli are found in the bronchial and nasal mucus.

During the general epidemic of influenza in 1891, the attention of bacteriologists was directed to the discovery of the specific organism of this disease. In 1892 Pfeiffer found in the bronchial secretions of thirty patients suffering from influenza a small bacillus which he considered to be the cause of the disease. Canon, who at about the same time made independent observations, found a similar bacillus in the blood of twenty patients suffering from influenza. Canon's method of preparing the cover-glasses is as follows: The blood is taken from the lobe of the ear or from the finger and spread in extremely thin layers on the cover-glasses. When these cover-glasses are thoroughly dry they are put in absolute alcohol for five minutes. After this they are placed in a staining solution composed of a concentrated aqueous solution of methylene blue, forty grammes; one-half per cent. of eosin dissolved in seventy per cent. alcohol, twenty grammes; distilled water, forty grammes. The cover-glasses are then placed in an incubating oven at 37° C. for from three to six hours, after which they are washed in water and dried. When examined under the microscope the red blood-corpuscles are found to be stained red by the eosin, and the leucocytes and bacilli are blue. The organism is in these cases sometimes found in large numbers, and sometimes only a few can be found in the field of the microscope. Pfeiffer considers that this organism is the specific cause of influenza for the following reasons: first, that it was found in all uncomplicated cases of influenza examined, in the purulent bronchial secretions, and that it was frequently situated in the protoplasm of the pus corpuscles; second, that it was found only in cases of influenza, numerous control experiments having demonstrated its absence in ordinary bronchial catarrh.

The similarity of the clinical appearances between a case of bilious remittent fever so common in the southern portion of this country, as well as on the west coast of Africa, and yellow fever is so marked that the difficulties of differentiating these two diseases are frequently very great. Cholera may be mistaken for an attack of remittent fever of the congestive type. The specific organism of yellow fever has not as yet been discovered, although Sternberg has made very exhaustive research in this line. There is every reason to believe that yellow fever is due to some specific organism, and there is a vast field of research open in this direction for the enthusiastic bacteriologist. Regarding swamp or intermittent fever, scientific research has established beyond a doubt the existence of the specific organism which stands in an etiological relation to the disease. The assistance that the knowledge of this organism gives in making an accurate diagnosis of malarial fever is very great. This organism, which was discovered by Laveran in 1880, is not a bacterium, but is a parasite belonging to the class of protozoa. The development and multiplication takes place within the blood-corpuscles. It is claimed that different forms of this organism are found in the different types of malarial fever. How much these various forms are related to one another, whether they are different stages of the same growth, or whether they belong to different species, has not been definitely settled. It is the opinion of Laveran, who has investigated the subject very carefully, that this protozoön is a polymorphic organism, and that the change in form causes a change in the type of the fever due to some unknown condition of the patient. Osler, on the other hand, thinks that the different forms of the organism belong to separate and distinct species. Laveran divides this germ into four classes: first, spherical bodies with nuclei with distinct amœboid movement; second, crescentic shapes with nuclei; third, a rosette form; fourth, bodies with flagella. These flagella are found only in fresh blood, and are so delicate that it is impossible to see them unless they are in motion. Councilman says that the bodies with flagella are found most commonly in blood aspirated from the spleen. These organisms are found in the red blood-corpuscles or adhering to them. It is supposed that they absorb the pigment from the corpuscle, and after increasing in size at the expense of the blood-corpuscles this pigment is found in distinct granules and rods. Laveran found the crescentic forms of this organism more common in the quartan and irregular types of the disease. Quinine is said to act upon the amœboid form of the parasite and gradually destroys it. Phagocytosis plays an important rôle in the spontaneous recovery from malarial fever, and it is a question whether the effect of quinine in the treatment of this disease is due to a direct action of the drug on the organism or to a stimulation of the leucocytes. Golge's investigations would seem to prove that there are several distinct parasites, and that tertian, quartan, and double quartan fevers are due to organisms having a life cycle which corresponds with each variety of the fever. The manner of examining blood is as follows: Extremely thin layers of blood are spread on the cover-glasses, which are allowed to dry, being protected from dust. The cover-glasses are then placed on a brass plate and heated for an hour or an hour and a half, and are then stained in a very dilute solution of methylene blue. It is not well to use eosin, as some varieties decolorize the blue and thus lead to faulty results. The cover-glasses should then be carefully washed, dried, and mounted. It is always well to examine the blood in a fresh state unstained on a warm stage of the microscope, as the process of staining interferes with the amœboid movements. Another method of preparing cover-glasses is to place them for five or ten minutes in alcohol and then dry in the air, instead of heating them as before mentioned. The advantage of this method is the fact that too much heat will destroy the organism. In Mannaberg's method of staining, the cover-glasses are placed for five minutes in water and then dried with filter paper and placed in a very weak solution of acetic acid for the purpose of removing the hæmoglobin. The cover-glasses are then placed in a fixing preparation composed of thirty parts of a concentrated watery solution of picric acid, thirty parts of water, and one part of vinegar. Then they are placed from twelve to twenty-four hours in a solution of alum hæmatoxylin. When this preparation is properly mounted the parasites and leucocytes appear blue, the red corpuscles without color.

⁂